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REMARKS

Claims 1-59 are pending in the present application. Claims 8-51 and 56-59 have been allowed.

Claims 1-7 and 52-55 are rejected by the Office Action for assertedly containing a limitation that is not disclosed in the specification. Specifically, the Office Action rejected independent Claims 1 and 52 (and their respective dependent claims) because of the phrase "having a dielectric constant less than that of SiO_2," which the Office Action claims is not supported by the specification. However, this limitation is fully disclosed within the specification of the present invention and its co-pending and commonly assigned published patent application 2004/0251549 by Huang et al. (hereinafter "the '549 application"), which was incorporated by reference into the present specification (Para. [0001]).

In the present application the entire purpose of the invention is to "minimize the dielectric constant k of the insulating material (dielectric) between the conducting lines" (Para. [0004]) below the "common insulating material used for ILD layers...silicon oxide (SiO_2)" (Para. [0003]). The present invention minimizes this dielectric constant while also dealing with the problem that "lower-k dielectric materials usually have poor mechanical strength and related properties" (Para. [0005]). Accordingly, one of ordinary skill in the art reading the specification in its entirety would understand that the whole purpose is to minimize the size of a semiconductor device through the use of an ILD that has a dielectric constant less than the dielectric constant of the "common insulating

material...(SiO_2)," which would necessarily require using materials with dielectric constants less than SiO_2.

Further, the '549 application (which was incorporated by reference) discusses "A multiple layer metal interconnect process [that] provides for both good electrical properties and good mechanical properties by using a first extremely low k dielectric material at the lower level metal layers, a second extremely low k dielectric material at the middle level metal layers, and a low k dielectric material at the upper level metal layers" (the '549 application, Abstract). In disclosing the invention, the '549 application gives ranges of dielectric constants for what the specification considered "low-k dielectric constants," such as those used for the first and third low dielectric constant material sub-layers in Applicants' Claim 1 and Claim 52. In the '549 application, a range of 3.0 to 4.2 (Para. [0021]) was disclosed for "low-k dielectric constants" and a range of 2.5 to 4.2 (Para. [0020]) was disclosed for extremely low-k dielectric constants. For both sets, the upper range for what the Specification considered to be a low-k dielectric constant was given as 4.2, which one having ordinary skill in the art will recognize as being equivalent to the dielectric constant of SiO_2.

Applicants further note that the present application discusses some of the dielectric constants for the first and third low-dielectric constant material sub-layers in some of the preferred embodiments. In one preferred embodiment, the application lists a range of 2.2 to 2.5 for the dielectric constant of the first low-dielectric constant material sub-layer and a range of 2.8 to 3.3 for the dielectric constant of the third low-dielectric constant material sub-layer (Para. [0024]). These ranges that are given as exemplary embodiments of the invention are all less than the dielectric constant of SiO_2.

From the background problem that the present invention was designed to solve, to the disclosure that these applications consider anything below 4.2 (the dielectric constant of SiO_2) to be a "low dielectric constant material," to the fact that all of the ranges given in the present application have dielectric constants below SiO_2, the phrases "forming a first low-dielectric constant material sub-layer...having a dielectric constant less than that of SiO_2" and "forming a third low-dielectric constant material sub-layer...having a dielectric constant less than that of SiO_2" in Applicants' Claim 1 is fully disclosed in the Specification. Further, the phrases "a first low-dielectric constant material sub-layer...having a dielectric constant less than that of SiO_2" and "a third low-dielectric constant material sub-layer...having a dielectric constant less than that of SiO_2" in Applicants' Claim 52 are also fully disclosed in the Specification. Accordingly, Applicants respectfully request the withdrawal of the rejections of Applicants' Claim 1 and Claim 52.

Claims 2-7 and 53-55 depend from and further limit independent Claims 1 and 52, respectively, in a patentable sense. Accordingly, Applicants respectfully request that the rejections of Claims 2-7 and 53-55 be withdrawn as well.

In view of the above, Applicants respectfully submit that this response complies with 37 C.F.R. § 1.116. Applicants further submit that claims 1-59 are in condition for allowance. If the Examiner should have any questions, please contact Applicants' agent at the number listed below. No fee is believed due in connection with this filing. However, in the event that there are any fees due, please charge the same, or credit any overpayment, to Deposit Account No. 50-1065.

Respectfully submitted,

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